

本試卷共有兩題，他們均需要您提出一些解決方法，請儘量發揮。Good Luck!

1. (50%) George 是一家大型超級市場的經營者，一個星期前得知 5S 運動的益處後，決定要推行 5S 運動，並尋求您的幫忙，請問您會如何推動此 5S 運動。
註：(1) 其他問題環境假設可自行增加，但不能因此而偏離其「5S 推行運動」的主題，而且務必將假設列出，然後在您的問題環境下，提出解題方法。(2) 請將所欲提出的方法之目的（或目標）加以說明。(3) 也請將您將所欲提出的方法（或各種方法）之步驟，加以清楚說明，例如：您可繪製方法的流程圖，來幫助他人了解。
2. (50%) Nancy 是一家工廠的老闆，由於最近同業的競爭，工廠面臨如何提昇生產效率與降低生產成本的問題。Nancy 請您幫忙解決此問題，請問您會如何規劃此改善專案。註：(1) 其他問題環境假設（例如：其工廠與產品的特性）可自行增加，但不能因此而偏離其「提昇生產效率與降低生產成本」的主題，而且務必將假設列出，然後在您的問題環境下，提出解題方法。(2) 請將所欲提出的方法之目的（或目標）加以說明。(3) 也請將您將所欲提出的方法（或各種方法）之步驟，加以清楚說明，例如：您可繪製方法的流程圖，來幫助他人了解。

國立中央大學工業管理研究所九十三年度碩士在職進修專班入學考試試題卷

考試科目：經營管理個案分析

共 1 頁，第 1 頁

考試時間：90 分鐘

個案：Please refer to the two attached articles: 1) Operations Tour: The US Postal Service, and 2) Operations Tour: Morton Salt.

請以中文或英文簡短回答以下問題（注意答案的字數限制）。

個案 1—Operations Tour: The US Postal Service.

- Q1. (15%) Why is it important for the postal service to have a high volume of mail to process? (up to 20 words ; 最多 20 個字)
- Q2. (15%) What caused productivity to increase? (up to 20 words ; 最多 20 個字)
- Q3. (20%) What results were achieved by the postal service's changes? (up to 30 words ; 最多 30 個字)

個案 2— Operations Tour: Morton Salt.

- Q4. (15%) What are some of the possible reasons why the company continues to use the old processing equipment instead of buying new, more modern equipment? (up to 20 words ; 最多 20 個字)
- Q5. (15%) Determine the approximate number of tons of salt produced annually. (Hint: one ton = 2000 pounds, and one pound =16 ounces; up to 10 words ; 最多 10 個字)
- Q6. (20%) What improvements can you suggest for the plant? (Up to 50 words ; 最多 50 個字)

The US Postal Service

"Neither rain, nor snow..."

The US Postal Service is the largest postal service in the world, handling about 41% (630 million pieces a day) of the world's mail volume. The second largest is Japan, which handles only about 6% of the world's mail. The US Postal Service is huge by any standard. It employs over 760,000 workers, making it the largest civilian employer in the U.S. It has over 300,000 mail collection boxes, 38,000 post offices, 130 million mail delivery points, more than 300 processing plants to sort and ship mail, and more than 75,000 pieces of mail processing equipment. It handles over 100 billion pieces of first class mail a year, and ships about 3 billion pounds of mail on commercial airline flights, making it the airlines' largest shipper.

Processing First-Class Mail

The essence of processing the mail is sorting, which means organizing the mail into smaller and smaller subgroups to facilitate its timely delivery. Sorting involves a combination of manual and automatic operations. Much of the mail that is processed is first-class mail.

Most first-class mail is handled using automated equipment. A small portion that cannot be handled by automated equipment must be sorted by hand, just the way it was done in colonial times.

The majority of first-class mail begins at the advanced facer canceling system. This system positions each letter so that it is face up, with the stamp in the upper corner, checks to see if the address is handwritten, and pulls the hand-addressed letters off the line. It also rejects letters that have the stamp covered by tape, have no postage, third-class mail, or have meter impressions that are too light to read. The rejects are handled manually. The remaining letters are cancelled and date stamped, and then sorted to one of seven stackers.

Next the letters go to the multi-line optical character readers, which can handle both printed and pre-barcode mail, but not hand-addressed mail. The optical reader sprays a barcode on the mail that hasn't been pre-barcode, which represents up to an 11-digit ZIP code. For hand-addressed mail, a picture is taken of the front of the letter, and the image is displayed on a remote terminal, often in another city, where an operator views the image and provides the information that the optical readers could not determine so that a barcode can be added.

Barcode readers then sort the mail into one of 96 stackers, doing this at a rate of more than 500 a minute. The mail goes through another sort using manually-controlled mechanical

equipment. At that point, the mail is separated according to whether it is local or out-of-town mail. The out-of-town mail is placed into appropriate sacks according to its destination, and moved to the outgoing send area where it will be loaded on trucks.

The local mail is moved to another machine that not only sorts the mail into local carrier delivery routes, it sorts it according to delivery walk sequence!

Small parcels, bundles of letters, and bundles of flats are sorted by a bundle-sorting machine.

Productivity

Over the years, the Postal Service has experienced an ever-increasing volume of mail. Productivity has been an important factor for the Postal Service in keeping postal rates low and maintaining rapid delivery service. Two key factors in improved productivity have been the increased use of automation and the introduction of zip codes.

Mail processing underwent a major shift to mechanization during the 1950s and 1960s, which led to more rapid processing and higher productivity. In 1978, an expanded zip code was introduced. That was followed in 1983 by a four-digit expansion in zip codes. These changes required new, automated processing equipment, including the use of barcodes and optical readers. All of these changes added greatly to productivity. But even with these improvements, the Postal Service faced increasing competitive pressures.

Competition

In the late 1980s, the Postal Service experienced a slowdown in the volume of mail. Some of this was due to a slowing of the economy, but most of it was the result of increasing competition. Delivery giants FedEx and UPS, as well as other companies that offer speedy delivery and package tracking gave businesses and the general public convenient alternatives for some mail services. At the same time, there was a growing use of fax machines, electronic communications, and increased use of alternate forms of advertising such as cable TV, all of which cut into the volume of mail.

Strategies and Tactics Used to Make the Postal Service More Competitive

To meet these challenges, the Postal Service developed several strategies to become more competitive. These included reorganizing, continuing to seek ways to keep costs down, increasing productivity, and emphasizing quality and customer service. Here is an overview of the situation and the strategies and tactics used by the Postal Service.

The Postal Service began working more closely with customers to identify better ways to meet their needs and expanded customer conveniences such as stamps on consignment. With

the help of business mailers, the Postal Service continued support for rates reflecting customer work-sharing features, many tied to automation, to give customers more flexibility. At the same time, the Postal Service began forming Customer Advisory Councils—groups of citizens who volunteered to work with local postal management on postal issues of interest to the community. In 1990, the Postal Service awarded two contracts to private firms to measure first-class mail service and customer satisfaction. In 1992, the Postal Service stepped up its quest to become more competitive by reducing bureaucracy and overhead in order to improve service and customer satisfaction, and to reduce the need to increase postage rates.

To help accomplish these goals, the Postal Service underwent a reorganization. Layers of management were eliminated and overhead positions were cut by about 30,000. Five regions and 73 field divisions were replaced by 10 areas, each with a manager for customer services and a manager for processing and distribution. Ten customer service areas were established, with managers for customer service and processing and distribution in each area, as well as a marketing and sales office. The new structure allowed postal managers to be focused, improved communications, and empowered employees to meet customer needs. The Postal Service also took other steps to improve service. In 1993, it implemented improvements in pro-

cessing and mail delivery at major postal facilities, expanded retail hours, and developed a more user-friendly *Domestic Mail Manual*. In cooperation with business customers, the Postal Service began to develop new services to meet specific mailer needs and to overhaul and simplify its complex rate structure. It also awarded contracts for two more external tracking systems, one to measure satisfaction levels of business mailers, and the other to measure service performance of third-class mail.

The reorganization eliminated some programs, cut costs, attracted new business, and reduced the US Postal Service's projected deficit.

Morton Salt

www.mortonintl.com

Introduction

Morton Salt is a subsidiary of Morton International, a manufacturer of specialty chemicals, air bags, and salt products. The Morton salt-processing facility in Silver Springs, New York, between Buffalo and Rochester, is one of six similar Morton salt-processing facilities in the United States. The Silver Springs plant employs about 200 people, ranging from unskilled to skilled. It produces salt products for water conditioning, grocery, industrial, and agricultural markets. The grocery business consists of 26 oz. round cans of iodized salt. Although the grocery business represents a relatively small portion of the total output (approximately 15 percent), it is the most profitable.

Salt Production

The basic raw material, salt, is obtained by injecting water into salt caverns that are located some 2,400 feet below the surface. There, the salt deposits dissolve in the water. The resulting brine is pumped to the surface where it is converted into salt crystals. The brine is boiled, and much of the liquid evaporates, leaving salt crystals and some residual moisture, which is removed in a drying process. This process is run continuously for about six weeks at a time. Initially, salt is produced at the rate of 45 tons per hour. But the rate of output decreases due to scale build up, so that by the sixth week, output is only 75 percent of the initial rate. At that point, the

process is halted to perform maintenance on the equipment and remove the scale, after which, salt production resumes.

The salt is stored in silos until it is needed for production, or it is shipped in bulk to industrial customers. Conveyors move the salt to each of the four dedicated production areas, one of which is round can production. (See diagram.) The discussion here focuses exclusively on round can production.

Round Can Production

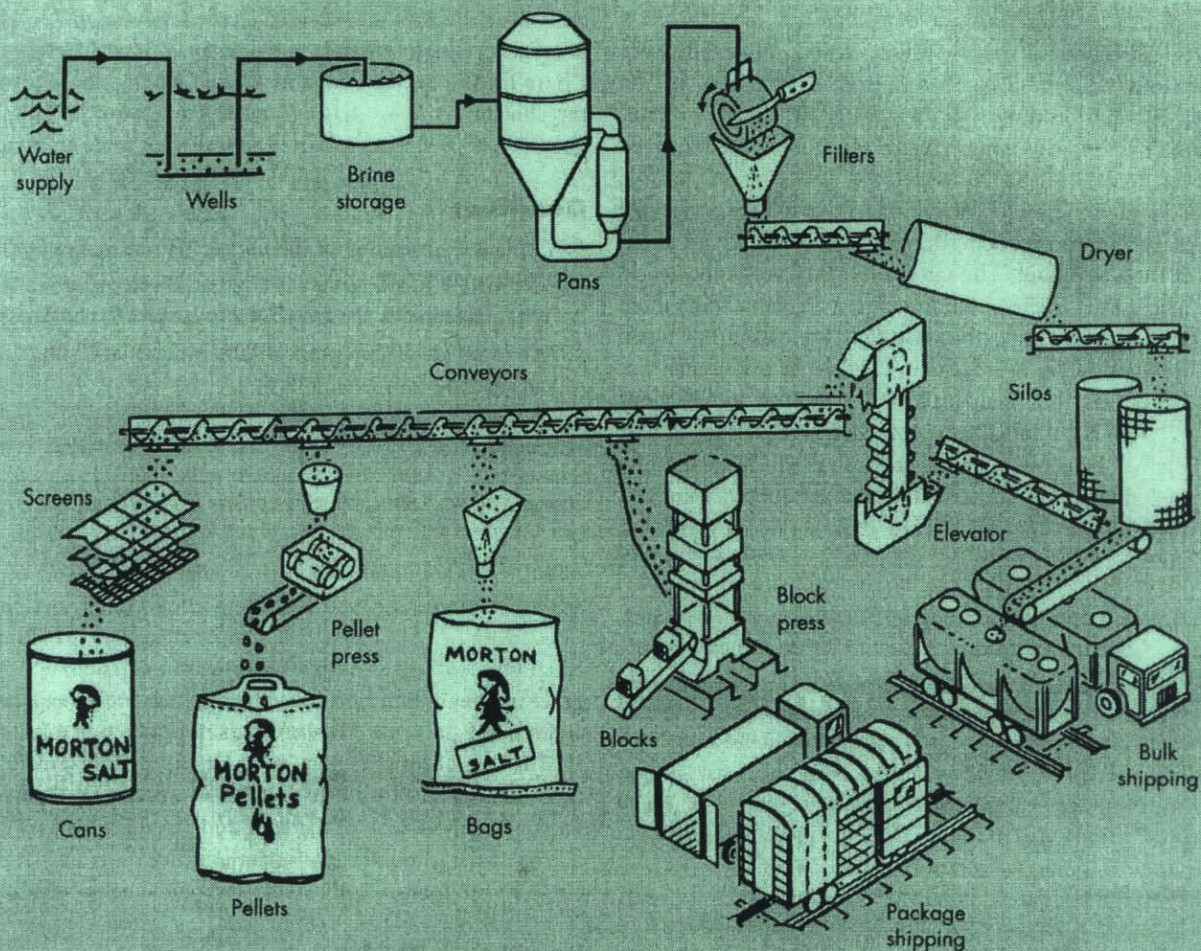
Annual round can production averages roughly 3.8 million cans. Approximately 70 percent of the output is for the Morton label, and the rest is for private label. There are two parallel, high-speed production lines. The two lines share common processes at the beginning of the lines, and then branch out into two identical lines. Each line is capable of producing 9,600 cans per hour (160 cans per minute). The equipment is not flexible, so the production rate is fixed. The operations are completely standardized; the only variable is the brand label that is applied. One line requires 12 production workers, while both lines together can be operated by 18 workers because of the common processes. Workers on the line perform low-skilled, repetitive tasks.

The plant produces both the salt and the cans the salt is packaged in. The cans are essentially a cylinder with a top and a bottom; they are made of cardboard, except for a plastic pour spout in the top. The cylinder portion is formed from two sheets of chip board that are glued together and then rolled into a continuous tube. The glue not only binds the material, it also provides a moisture barrier. The tube is cut in a two-step process: it is first cut into long sections, and those sections are then cut into can-size pieces. The top and bottom pieces for the cans are punched from a continuous strip of cardboard.

2,800

2,800,000 x 26 = 72,800,000
+ 6.5 = 72,806,500

6.5
475



The separate pieces move along conveyor belts to the lines where the components are assembled into cans and glued. The cans are then filled with salt and the pour spout is added. Finally, the cans are loaded onto pallets and placed into inventory, ready to be shipped to distributors.

Quality

Quality is checked at several points in the production process. Initially, the salt is checked for purity when it is obtained from the wells. Iodine and an anti-caking compound are added to the salt, and their levels are verified using chemical analysis. Crystal size is important. In order to achieve the desired size and to remove lumps, the salt is forced through a scraping screen, which can cause very fine pieces of metal to mix with the salt. However, these pieces are effectively removed by magnets that are placed at appropriate points in the process. If, for any reason, the salt is judged to be contaminated, it is diverted to a nonfood product.

Checking the quality of the cans is done primarily by visual inspection, including verifying the assembly operation is

correct, checking filled cans for correct weight, inspecting cans to see that labels are properly aligned, and checking to see that metal pour spouts are correctly attached.

The equipment on the production line is sensitive to misshapen or damaged cans, and frequently jams, causing production delays. This greatly reduces the chance of a defective can getting through the process, but it reduces productivity, and the salt in the defective cans must be scrapped. The cost of quality is fairly high, owing to the amount of product that is scrapped, the large number of inspectors, and the extensive laboratory testing that is needed.

Production Planning and Inventory

The plant can sell all of the salt it produces. The job of the production scheduler is to distribute the salt that is stored in the silos to the various production areas, taking into account production capacities in each area and available inventory levels of those products. A key consideration is to make sure there is sufficient storage capacity in the silos to handle the incoming salt from brine production.

Equipment Maintenance and Repair

The equipment is 1950s vintage, and it requires a fair amount of maintenance to keep it in good working order. Even so, breakdowns occur as parts wear out. The plant has its own tool shop where skilled workers repair parts or make new parts because replacement parts are no longer available for the old equipment.